Accelerator Controls Section
Test Procedure: assy #94028092 RHIC Utility Module, V108 Rev C

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Equipment Used: VME chassis; located in test rack #3 in lab #1
MVME 162 processor board configured as a front end computer (FEC)
l-1P6236B triple output bench power supply
6U VME extender card modified with connector to HP6236B supply
V108 wirewrap prototype used for programming temperature sensor
PC computer running VTXT6 terminal emulation program
V108 schematic diagram, 94028090
Heat gun
V105 Encoder board
V106 Input board
V103 Reset Module board (must be placed in slot 3)
V108 to be tested, prewired for base address 0xf00004000, Rev C
Source of Timeline on a Twin-Ax cable, use TR4 real timeline located in rack #3
2 cables with Twin-Ax on both ends
Cable with Lemo connectors on both ends

1.0 General Inspection

1.1 Documentation
a. Record serial number.
b. Record revision number of module.

1.2 Physical Inspection
a. Inspect front panel for defects.
b. Inspect module assembly for workmanship to applicable IPC standards.

2.0 Electrical Tests

2.1 Power to ground shorts
a. using the DVM confirm there are no electrical shorts between +5V and ground.
b. using the DVM confirm there are no electrical shops between +12V and ground.
c. using the DVM confirm there are no electrical shorts between -12V and ground.

3.0 Initial Setup

a. Remove JACK jumper and Bus Grant jumpers for slot 2 on the VME backplane in the VME chassis used for testing the V108's.
b. Boot up PC and start VTXT6.
c. Connect PC to FEC serial port 2.
d. Connect extender card to bench supply.
e. Install extender card into slot 2 of the VME chassis. Turn the bench supply on and adjust the output voltage for +5V and then turn off the supply.
f To program the temperature sensor (DALLAS DS1620) install it into the Spin socket on the wirewrap prototype.
g. Set the DIP switch to the following: 7 - open, 6- closed, 5 - closed.
h. Install the board in any empty socket in the VME chassis and turn the chassis on.
i. The LED is initially on, after it turns off then back on again, turn off chassis power and remove the board. The temperature sensor is now programmed for a threshold of 35 deg. C
j. Remove the temperature sensor from the prototype and install it on the V108 under test.
k. Turn on the VME chassis and let the FEC boot up.

l. When the FEC is finished booting up the following prompt will appear->
m. At the prompt enter the following command, cd “home/cfsa/stein/tests”
n. Now enter, Id <testUtil.o
o. On the V108 under test install jumpers E58-E60 and E59-E61.
p. Check to see that the bench power supply is turned off.
q. Install the V108 under test into the extender card.
r. Turn on the bench supply.
s. Check that the UC1 front panel LED now turns on.
t. At the prompt enter the following command, testUtil(0xf0004000)
u. A start up message will flow appear on the screen.
v. Follow on screen instructions and a menu will appear.
w. Connect the timeline source to the V108 Event Link input and verify the Event Link Led is on.
x. Connect a twin-ax cable from the V105 RTDL output to the V108 RTDL input and verify the RTDL LED is on.
y. Connect a twin-ax cable from the V103 Remote Reset output to the V108 remote reset input and verify the RSTLNK LED is on.

4.0 Testing a V108

a. Select menu choice 1. Test ID
b. Verify the following message: Board ID - V108; Rev C; Serial #XXXX
c. Verify the serial number displayed matches the serial number recorded.
d. Select menu choice 2. Test R/W Registers
c. Follow on screen instructions to test routing and vector registers for environment, timeline and external interrupts and RAM locations for timeline filter control and RTDL buffers. This will require you to hit enter 8 times.
f. Verify the “ALL BITS PASSED” message for all registers and RAM locations. Verify that the UC2 LED is now lit.
g. Select menu choice 3. Test Status Registers
h. The following message should be displayed:

Link Status:
RTDL link OK
Timeline event link OK
Remote reset link OK
board initialized
temp nominal
reset drives VME sysrst

i. Hit enter and the following message should be displayed:

Environment Status:
fans OK
+12V OK
-12V OK
+5V OK
temperature XX degrees C

j. Hit enter and the following message should be displayed:

FIFO status:
low priority fifo empty
high priority fifo empty

k. Select menu choice 4. Show Link Errors

1. The following message will be displayed
   RTDL frame error count = XX
   RTDL parity error count = XX
   Timeline frame error count = XX
   Timeline parity error count = XX

4.1 Testing a V108 Interrupts

a. Select menu choice 5. Test Interrupts
   There are three separate interrupt sources on the V108, timeline interrupts, environment interrupts and external interrupts. Environment interrupts are tested first. Follow on screen instructions.
b. Ground pin P2A5 on the extender card (the left jumper post) using a clip lead jumper.
c. A message indicating a fan fail should occur; remove jumper.
d. Remove the jumper on pin P1C31 on the extender card.
e. After a few seconds delay a message indicating +12V failure should occur; replace jumper.
f. Remove the jumper on pin P1 A31 on the extender card.
g. After a few seconds delay a message indicating -12V failure should occur; replace jumper.
h. Slowly and carefully adjust the output voltage on the HP6236B bench supply down towards 4.5V.
i. At approximately 4.7V a message indicating +5V failure should occur; At that point adjust the output voltage back up to 5V. Note even at the voltage that will cause an interrupt, the V108 will still be functioning.
j. Disconnect the timeline source twin-ax cable from the Event link input.
k. A message indicating Event link fault should occur; replace the cable.
l. Disconnect the RTDL twin-ax cable from the RTDL input.
m. A message indicating RTDL fault should occur; replace the cable.
n. Disconnect the remote reset twin-ax cable from the remote reset link input.
o. A message indicating remote reset link fault should occur; replace the cable.
p. Taking the heat gun ***VERY CAREFULLY*** apply heat to the temperature sensor U3. Do not hold the heat gun closer then two (2) feet from the circuit board. Do this until an over temperature fault message occurs. Note that the temperature sensor is set for 35 deg. C if the steps in 3.0 e-i were followed correctly and thus not much heat over room temperature should be needed.
q. Follow on screen instructions to test timeline (event link) interrupts. Enter y'. For the code enter 0A and h for high priority. The following message will appear: filter ram addr 0xf0004815= 3**.**
r. Timeline interrupt received messages will now appear. The software is set up to generate 10 interrupts before automatically disabling. Verify the following message:
   Interrupt received address 0xf000405d= 0xa
s. Follow on screen instructions to test external interrupts. Plug one end of the LEMO cable into the V105 output labeled BUFEVNT. This will be the source for external interrupts.
t. Plug the other end into the V108 input labeled EXINTA and verify the message:
   External Interrupt Received from channel A.
   Remove the cable from EXINTA and hit enter.
u. Now plug the cable into the V108 input labeled EXINTB and verify the message:
   External Interrupt Received from channel B.
v. Going back to the main menu select choice 5 again this time bypassing environment interrupt tests. Enter 'y' for timeline interrupts and enter code 15 and l for low priority.
   Filter ram addr 0xf000482b= 1 message will appear.
w. Again 10 interrupts will be generated before disabling. Verify the following message:
   Interrupt received address 0xf000405d= 0x15.
   When done follow on screen instructions to bypass external interrupt tests and return to the main menu.

x. The test is done. Note as an alternate to selecting menu choices 1-4, menu choice 5 can be selected (End to End). This does the same tests as above but you only have to make one menu selection.

4.2 Testing RTDL Link

a. Choose menu choice 6 - System Test
b. Verify that a V105 board is in slot 4 and a V106 is in slot 6.
c. Verify that the Event link is connected to the V105 EVENTLNK input twinax connector. Use the blue twinax cable labeled Eventlink from fanout and number 4.
d. Connect the RTDL output of the V105 to the RTDL input of the V108 (labeled RTDL) using a twinax cable.
e. Verify the RTDL LED on the V108 is now lit.
f. Now follow on screen instructions for testing.
g. Use value **123456** hex for the first channel.
h. Use value **abcdef** hex for the second channel.
i. Verify the data transmitted is the same as the data received.
j. When the main menu reappears the RTDL test is done.

4.3 Testing Remote Reset

a. ***WARNING*** this test will reset the chassis
b. Before testing verify that the Vl03 Master Reset Module is in slot 3.
c. Connect the V103 Reset Link output to the V108 Reset link input (labeled RSTLNK) using a twinax cable.
d. Verify the RSTLNK LED is now lit.
e. Choose menu choice 7 and follow on screen instructions.
f. The chassis should reset. Testing is now complete.

4.4 Final Tasks

a. The temperature sensor must now be reprogrammed. Repeat steps 3.0 e-i but at step 3.0f set the dip switch to the following settings: 7-open, 6- open, 5-closed. This will program the sensor for a threshold of 55 deg. C.